ENTOMOLOGICAL NEWS

Vol. LXXV APRIL, 1964 No. 4

A Preliminary Review of Maoriella, with Description of a New Species from the Chatham Islands.[1] (Chilopoda: Geophilomorpha: Chilenophilidae)

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The aberrant pachymeriine genus *Maoriella* occurs in New Zealand and adjacent islands where one species is fairly common. Only two species are known outside this area, one from southeastern Australia, of questionable identity, and a probably distinct and valid one from Tahiti. *Maoriella* is basically unlike any chilenophilid genus known from any other part of the world including southern South America, which shares with Australia and New Zealand some of the same or closely similar chilenophilid genera.

The present study attempts a preliminary review of the genus. A new species from the Chatham Islands is described. Utilizing a number of new characters and based upon my recent study of the types, a new key to all but one of the known species is proposed. I have also presented what I believe to be important generic characters as well as some thoughts about the systematic position of *Maoriella*, and, finally, I have summarized the known distributions of the species. Eventually it is my plan

[1] This study was undertaken with the aid of a grant from the National Science Foundation. I should like to express my gratitude to the following persons who have lent me specimens or welcomed me as a guest in their institutions to study the collections in their charge: Dr. H. W. Levi, Museum of Comparative Zoology, Harvard University, Cambridge; Professor Dr. Hans Strouhal, Director, and Dr. Gerhard Pretzmann, Naturhistorisches Museum, Vienna; Mr. Peter M. Johns, University of Canterbury, Christchurch, New Zealand.

to present a very detailed review of the genus, with a full description of each species and full distributional citations based upon large numbers of specimens currently being received from several sources in New Zealand.

Maoriella is of particular interest in that, although fundamentally a chilenophilid, certain of its features seem more reminiscent of the Geophilidae than of the Chilenophilidae.[2] Whether this implies evolutionary convergency or the preservation in *Maoriella* of certain stem features of the Geophilidae, from which chilenophilids appear to have been derived, cannot be determined with confidence, given existing evidence. None the less, I suspect that the evidence seems to favor the first, evolutionary convergency.

Quite clearly the cephalic plate, clypeus, phehensors, and second maxillary coxosternites with their connecting isthmus all bespeak the Chilenophilidae. The head, although not strongly elongate, is still more suggestive of the dolichocephalic chilenophilids than the brachycephalic geophilids. The clypeus has a very typical and conspicuous fenestra.[3] The prehensors, although not so massive and long as those of more typical chilenophilids, still extend far beyond the frontal margin of the head. The second maxillary isthmus is very shallow and either membranous or suturate.

On the other hand, the following features, while not entirely excluded from the Chilenophilidae, still seem more reminiscent

[2] I depart here from the higher categorical arrangement employed by Attems in his 1929 monograph of the order (p. 157). At that time he envisaged the Geophilidae to be divisible into a number of subfamilies, among them Pachymerinae and Chilenophilinae. My present interpretation allies the latter two groups in a separate family, Chilenophilidae, which is tentatively divisible into two subfamilies, Chilenophilinae and Pachymeriinae. When Attems proposed Pachymerinae, he did not make it clear upon which genus it was based, *Pachymerium* C. L. Koch, or *Pachymerinus* Silvestri, hence the confusion in the suffixes, -iinae *versus* -inae. My suspicion is that he must have had *Pachymerium* Koch in mind, and that Pachymerinae represents a *lapsus calami*.

[3] Fenestra, a term proposed recently by R. V. Chamberlin to replace the more confusing and ambiguous "clypeal area" of authors. Objectively speaking, a number of clypeal structures could accurately be called a clypeal area.

of the Geophilidae. The pleurograms,[4] although foreshortened, are prominent and arch strongly lateroanteriorly. Furthermore, they are distinctly digressive from the obliquely arching pleuroprosternal sutures. The sternites are deeply foveate anterocentrally. The posterior porefield (or porefields) of each sternite are massively developed. The ultimate sternite is much wider than long. The coxopleural pores do not open freely; instead they are aggregated, opening into concealed subsurface cavities.

In his first important synthesis of the Geophilomorpha, Attems included *Maoriella* among the geophiline genera (1926, p. 359), but in his monograph of 1929 he relocated the genus within the Pachymerinae (p. 279). In 1936 Archey, not having seen the 1929 monograph of Attems, independently came to the same conclusion (p. 62).

MAORIELLA Attems

Maoriella Attems, 1903, p. 284.
Mesolcotodon Chamberlin, 1920, p. 47. Archey, 1936, p. 58.
Philogeonus Chamberlin, 1920, p. 48. Archey, 1936, p. 58.
Novaralius Attems, 1947, p. 59. (New Synonymy).

Type-species: *Maoriella aucklandica* Attems, 1903. (Subsequent designation of Attems, 1929, p. 279. In 1936, p. 58, Archey designed *macrostigma* as type-species, but the Attems' selection has priority).

Generic Diagnosis

The following features taken together will distinguish the genus from all other known chilenophilid genera. Second maxillary statuminia absent. Ultimate tarsus consisting of two

[4] Pleurogram, a new term proposed here to replace "chitin line," "Chitinleiste," and other terms of authors. Through ambiguity and imprecision of use the older terms have too often led to confusion and error. Neither do they have the advantage of linguistic neutrality conferred by classical derivation, which explains in large part why no one of them has ever been adopted universally. The pleurogram is not to be confused with the pleuroprosternal suture, the latter always coursing laterad of the former.

articles; an unguiform pretarsus present. Ventral porefields of the more anterior sternite massively developed. Ultimate pedal sternite much wider than long. Coxopleural pores opening into concealed subsurface cavities.

The following is an extended diagnostic characterization of the genus as it is now known.

Cephalic Plate. Always longer than wide. Clypeus. Much wider than long, i.e., distance between paraclypeal sutures much greater than greatest anteroposterior distance. Anteromedially with a prominent fenestra. Prelabral plagulae absent. Paraclypeal sutures prominent and complete. Labrum. Distinctly tripartite; the sidepieces anteriorly overlapping the small triangular midpiece and nearly contiguous. Midpiece without distinct teeth or filaments. Sidepieces with long hyaline filaments. First Maxillae. Coxosternum without midlongitudinal division or infolding; without lappets. Each telopodite distinctly bipartite, with a robust lappet. Second Maxillae. Isthmus very shallow anteroposteriorly; midlongitudinally narrowly infolded and membranous, or membranous but not infolded, or apparently suturate, the two coxosternites thus said to be separated medially. Postmaxillary sclerites absent. Pore openings open mesally, without raised thickenings or statuminia. Telopodite: ventral condyle of first article well-developed, the dorsal condyle vestigial or essentially absent; terminal claw without filaments or serrulations, extremely long and thin. Prosternum. Anterior denticles present, these vestigial and small to very long and prominent. Pleuroprosternal sutures arching lateroanteriorly and meeting or nearly meeting anterior margin. Pleurograms present but relatively short, digressive from their pleuroprosternal sutures. Prehensor. Anteriorly extending far beyond forward margin of head. Tarsungula and trochanteroprefemur each with a prominent denticle; intermedial articles without denticles. Legs. Each pretarsal claw with two parungues, these short and not hypertrophied. Sternites. Without carpophagus-structures. On anterior part of body each sternite with a deep anterocentral fovea. Anterolateral porefields present but very small and vague. Posterior porefields: On anterior part of body each sternite either with a single, un-

interrupted, essentially elliptical band of pores, or this band midlongitudinally divided by a narrow sulcus to form, in effect, two pore fields; on middle and posterior parts of body each sternite (except ultimate pedal sternite) with two distinctly separated porefields. Ultimate Pedal Segment. Pretergite bilaterally non-fissate. Greatest width of sternite always exceeding greatest length. Coxopleuron: Not greatly inflated; without freely-opening pores, ventrally with two pore cavities, the more posterior homogenous or heterogenous, the more anterior heterogenous, anteroventrally with a third pore cavity, this heterogenous. Ultimate leg: Not inflated in females, slightly inflated in males; with two tarsal articles; pretarsus strongly unguiform. Postpedal Segments. Female gonopods fused at midline, flat, low, each unipartite. Male gonopods widely separated, conical, each apparently unipartite. Anal pores prominent, lateral.

Key to Known Species of Maoriella [5]

1a Clypeal setae very few in number, confined to anterocentral portion of clypeus, none lateral (Fig. 2). Prosternal denticles very long and sharply pointed or else blunt and abortive (Fig. 4).....2

1b Clypeal setae very numerous, extending across full width of anterior clypeus between paraclypeal sutures (Fig. 1). Prosternal denticles essentially absent or blunt and abortive (Fig. 3).....3

2a Prosternal denticles very long and sharply pointed. On anterior part of body each sternite with one continuous, posterior porefield. Denticle of trochanteroprefemur long, essentially as long as denticle of tarsungula. Pedal segments ca. 53–57.....**ecdema**, sp.n.

2b Prosternal denticles short, blunt, abortive. On anterior part of body each sternite with the posterior porous area midlongitudinally divided by a narrow sulcus. Denticle of trochanteroprefemur short, much shorter than tarsungular denticle. Pedal segments ca. 41–49. .**zelanica** (Chamberlin)

3a Pedal segments 91 (in holotype, only known specimen). On anterior part of body each sternital posterior porous area divided by a midlongitudinal sulcus. . . .**aucklandica** Attems

[5] Does not include *australis* Archey, q.v.

3b Pedal segments ca. 61–65. Sternital porous areas single or double 4

4a Denticle of trochanteroprefemur very short, much shorter than that of the tarsungula. On anterior part of body each sternital porous area midlongitudinally divided by a narrow sulcus.....**macrostigma** Attems

4b Denticle of trochanteroprefemur essentially as long as that of tarsungula, both (relative to those of other species) short and blunt. On anterior part of body each sternital porous area single, without midlongitudinal sulcus..... .....**edentatus** (Attems)

Maoriella zelanica (Chamberlin)

Philogeonus zelanicus Chamberlin, 1920, p. 48. Archey, 1936, p. 61.

Type Locality: New Zealand, Lake Takopema (Chamberlin) = Lake Takapuna (Archey), near Auckland.

Type Deposition: Museum of Comparative Zoology, Harvard University.

Distribution: Known only from North Island, New Zealand.

Maoriella aucklandica Attems

Maoriella aucklandica Attems, 1903, p. 285.

Type Locality: New Zealand, Auckland, Bay of Islands.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: Known only from the type-locality.

Maoriella macrostigma Attems

Maoriella macrostigma Attems, 1903, p. 284.
Mesolcotodon laetus Chamberlin, 1920, p. 47. Archey, 1936, p. 60.

Type Locality: New Zealand, North Island. Neither the original description nor Attems' specimen labels gives a more precise locality citation.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: New Zealand, North and South Islands. "Although this species is found in hilly country inland, it is commoner near the coast, and sometimes occurs on the beaches below high water. It is the common garden centipede of Auckland." (Archey, 1936, p. 61).

Remarks: The original description was based upon four syntypes, three of which I have been able to locate in the Attems Collection at Vienna. All are clearly conspecific. One of these had been dissected by Attems, but the microscopical preparation of its mouthparts has not been found. I hereby designate the female with 63 pedal segments as the lectotype; it has been labelled accordingly.

Although the species was legitimately described as *macrostigma* originally, the specimen labels in Attems' handwriting give the name as *microstigma,* but it is clear that these are indeed the true types of *macrostigma,* and that he altered the name prior to publication.

In 1929 (p. 279) Attems distinguished between *macrostigma* and *aucklandica* as follows: "91 Beinpaare. Hinterrand des Kopfschildes eingebuchtet. Stigmen sehr klein: 1. *M. aucklandica;* 63–65 Beinpaare. Hinterrand des Kopfschildes gerade. Stigmen sehr gross: 2. *M. macrostigma.*" I have found the last two characters to be untrustworthy. The first of them seems very subtle and is in addition probably intraspecifically variable. The second is too subjective; a study of the types does not recommend its utility.

Maoriella edentatus (Attems) (New Combination)

Norvaralius edentatus Attems, 1947, p. 59.

Type Locality: Tahiti (Novara Expedition). No more specific locality than this is given in the original description or on the specimen labels.

Type Deposition: Naturhistorisches Museum, Vienna.

Distribution: Known only from the type locality.

Remarks: There is no question that the holotype is a *Maoriella.* Dr. Attems' original description of the genus and species is in error in regard to a number of important characters,

which doubtless led him to create a new genus for the reception of the species.

The specimen is in very poor condition and was obviously advanced in age at the time of its capture. The prehensorial denticles, for example, seem worn, so that the very short tarsungular denticle could simply represent wear rather than the natural condition, but without other specimens for study this cannot be established confidently. I feel, however, that this represents the original condition. Apart from the very small aforementioned denticle and the undivided porefields of the anterior part of the body, *edentatus* is very similar to *macrostigma*. We cannot exclude the possibility that this specimen, though aberrant, is conspecific with *macrostigma*.

The presence of a *Maoriella* in Tahiti, separated by a vast expanse of ocean from New Zealand, is of zoogeographical and ethnological interest because of the likelihood of its having been brought there, if it is actually a *macrostigma*, by early Polynesians in their astonishing voyages of exploration and settlement. In both Tahiti and New Zealand oral traditions describe voyages made between Central Polynesia and New Zealand. It is known that these early voyagers carried vegetation and other produce in their canoes, so that the possibility of chance introduction of small arthropods in this manner by man can by no means be ruled out.

Maoriella australis Archey

Maoriella australis Archey, 1936, p. 63.

Type Locality: Australia, Victoria, Chillingollah.

Type Deposition: Australian National Museum, Melbourne.

Distribution: Known only from the type locality.

Remarks: In presenting *australis* as new, Dr. Archey compared it with *macrostigma;* however, his diagnosis is not sufficiently detailed to permit his species' being included in the present key. His species may indeed be a distinct entity, or it could be a *macrostigma*. Several other chilopod species—doubtless through introduction by man—inhabit both southeastern Australia and New Zealand.

Maoriella ecdema, sp. n.

The new species differs from the known members of the genus in its possession of very long, pointed, dark prosternal denticles, and in its very long trochanteroprefemoral denticle, which is as long as the denticle of the tarsungula. The new form seems most like *zelanica*, differing from it in a number of characters, perhaps most notably in the following:

M. ecdema: (1) Prosternal denticles very long and sharply pointed. (2) Trochanteroprefemoral denticle as long as that of tarsungula. (3) On anterior part of body each sternite with a posterior porous area that is strictly undivided. (4) Paramedial sulci of head-plate and tergites present and prominent. (5) Pedal segments ca. 53–57.

M. zelanica: (1) Prosternal denticles abortive and blunt. (2) Trochanteroprefemoral denticle much shorter than that of tarsungula. (3) On anterior part of body each sternite with posterior porous area midlongitudinally divided by a sulcus. (4) Paramedial sulci of head-plate absent or essentially so. (5) Pedal segments ca. 41–49.

Description

Holotype, female. New Zealand, Chatham Island, Port Hutt, "Under stones, high water mark"; E. W. Dawson, leg.; 8 February 1954. Deposited in the University of Canterbury Museum, Christchurch, New Zealand.

Introduction. Length, 36 mm. Pedal segments, 57. Color: Antennae and head light yellowish-brown; tergites and legs pale sordid yellow. Shape: Very slightly attenuate anteriorly and posteriorly, the rear 5–6 segments strongly attenuate.

Antennae. Length (extended in Hoyer's mountant), 5 mm. Shape: Not flattened; articles filiform; the more proximal ones very long, thereafter decreasing gradually in length. Setae gradually increasing in number and decreasing in length from first through ultimate article. Ultimate article with special hyaline short robust setae on lateral, mesal and anterior surfaces. Cephalic Plate. Length, 1.38 mm, greatest width (on

anterior third) 1.08 mm. Anterior and rear margins essentially straight, sides slightly excurved, corners broadly rounded. Setae few but very long. Frontal sulcus present, joining the prominent paramedian longitudinal sulci. Prebasal plate entirely covered. Clypeus. Much broader than long. Paraclypeal sutures straight, wide, complete, meeting outer ends of fulcra. Anterocentrally with a prominent elliptical fenestra, this minutely punctate, not areolate. Prelabral setae absent; remaining setae occupying anterocentral part of clypeus, none lateral. Labrum. Midpiece essentially triangular, anteriorly overlapped by the nearly contiguous medial ends of the sidepieces. Each sidepiece with long hyaline filaments, each filament basally broad and narrowing distally to a shart point. Sidepieces and fulcra separated from clypeus by a distinct suture. First Maxillae. Coxosternum continuous centrally, without setae or lappets. Telopodite distinctly bipartite, the apical article very blunt, with a prominent lappet. Second Maxillae. Isthmus membranous centrally, i.e., in effect the two coxosternites separated. Postmaxillary sclerites and statuminia absent. Pore openings mesially open. Telopodite: First article with well-developed ventral condyle, the dorsal condyle vestigial, virtually absent; apical claw extremely long and thin. Prosternum. Anterior denticles triangular, very long, sharply pointed, deeply pigmented. Pleuroprosternal sutures arching obliquely laterally, complete to anterolateral margin. Pleurograms digressive from pleuroprosternal sutures, short, not passing toward condyles. Prehensor. When flexed, far exceeding anterior head margin. Dorsal and ventral blade edges smooth, not serrulate. Denticles: Absent on intermedial articles; that of trochanteroprefemur essentially thumb-shaped and as long as that of ungula which is triangular and sharply pointed. Poison calyx short, with long digitiform appendices, in intermedial articles. Poison gland short, terminating in trochanteroprefemur. Tergites. Basal plate: Anteriorly as wide as rear of headplate, posteriorly slightly narrower than first tergite; on each side of midline with a large unpigmented area. First through penult pedal tergites each bisulcate, clothed with few but long setae. Spiracies. The

first very slightly elliptical, those remaining circular. Legs. Relatively long and thin, with long setae. Pretarsi: Extremely long and thin, the distal half of each curved ventrad; anterior parungues much longer and more robust than posterior parun-

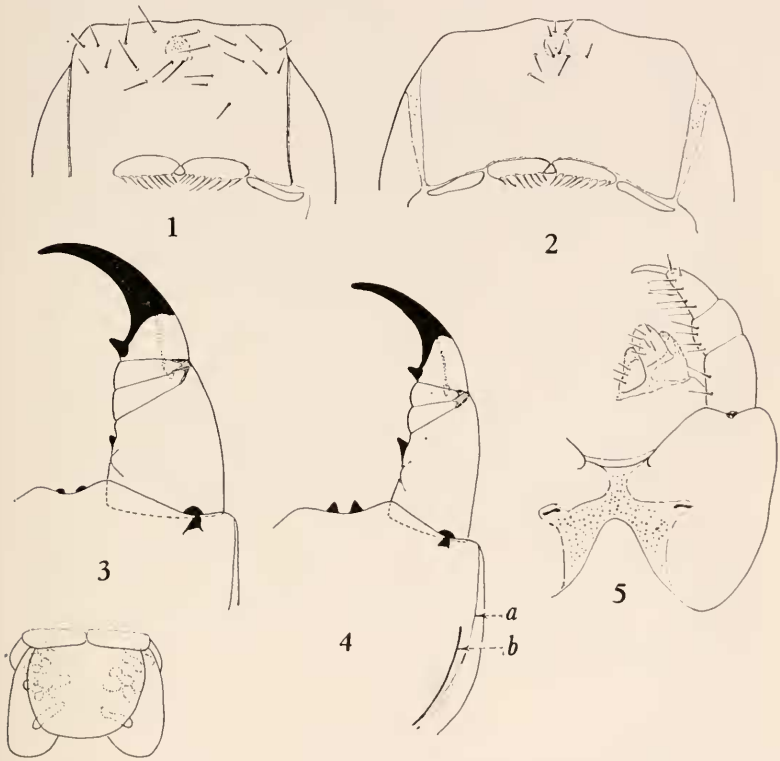

Fig. 1. *M. macrostigma* (not holotype). Clypeus and labrum; all setae shown. Fig. 2. *M. ecdema* (holotype). Clypeus and labrum; all setae shown. Fig. 3. *M. macrostigma*. Left prehensor and part of prosternum; setae deleted. Fig. 4. *M. ecdema* (holotype). Left prehensor and part of prosternum; setae deleted. a = pleuroprosternal suture. b = pleurogram. Fig. 5. *M. ecdema* (holotype). First and second maxillae; membranous, non-areolate areas stippled. Fig. 6. *M. ecdema* (holotype). Ultimate pedal segment; ventral aspect; setae deleted; concealed glandular apparatus in broken lines.

gues, the former about $\frac{1}{4}$ as long as their claws proper. Sternites. Carpophagus-structures absent. Sternites of about anterior quarter of body each with a deep anterocentral fovea. Subcoxal porefields present on all pedal segments but the last. Anterolateral porefields represented by very few, minute pores on all but the final segments. Posterior porefields: Present on all pedal segments except the ultimate; those of segments 1–18 each single, forming a wide elliptical band, from 19 through penult each porefield divided in two, the two parts gradually becoming smaller and more separated on successive sternite posteriorly. Ultimate Pedal Segment. Pretergite bilaterally not fissate, i.e., fused with its pleurites. Greatest width slightly in excess of length; sides slightly excurved, posteriorly convergent; rear margin straight. Presternite centrally divided. Sternite: Greatest width greatly in excess of length; sides and rear corners rounded. Coxopleuron: Laterally not swollen; anteriorly not extending forward of rear margin of penult segment; setae very sparse; with three pore-cavities, the most posterior ventral, simple, homogeneous, the middle one ventral, with aggregated pores, heterogeneous, the anterior one ventroanterior, extending forward dorsad along margin of coxopleuron, with aggregated pores, heterogeneous. Leg: Not at all inflated; setae sparse but very long; tarsus bipartite; pretarsus strongly unguiform. Postpedal Segments. Female gonopods fused at midline, each unipartite, very low and broad. Anal pores prominent, lateral, homogeneous.

Paratypes

The two female paratypes have 55 and 57 pedal segments. All three male paratypes have 53 pedal segments. Size range of the whole series, 31–36 mm. In general the paratypes agree closely with the holotype in all significant particulars. The males differ sexually dimorphically from the females as follows: Ultimate legs very slightly inflated, their ventral setae extremely numerous and short; gonopods widely separated, each long but apparently only unipartite.

The holotype and four of the paratypes are deposited in the University of Canterbury Museum. The fifth paratype is deposited in the myriapod collection of the U. S. National Museum.

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Distribution of the Bagworm in Pennsylvania [1]

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The bagworm, *Thyridopteryx ephemeraeformis* (Haworth), Psychidae, is frequently a serious pest of ornamental plantings, i.e., arbovitae, juniper, and honey locust. The spread of this moth is considerably inhibited, because the adult females are flightless and the larvae can only swing to nearby trees on their silken threads, be carried a few miles by wind currents, or crawl a few hundred yards to a nearby tree. Probably the most important factor in the dissemination of the bagworm is the transportation of infested nursery stock into bagworm-free areas.

During the past several years, records of the distribution of the bagworm were obtained: by searching the files of the Exten-

[1] Authorized for publication on October 10, 1963, as paper No. 2833 in the journal series of the Pennsylvania Agricultural Experiment Station.